Goddard Space Flight Center 2009 Sample Student Projects

Required Academic Level

Freshman/Sophomore
Undergraduate, Junior/Senior
Undergraduate

Category
Engineering

Subcategory
Detectors & Sensors

Project Title

Micro- and Nanotechnology Development for Advanced Liquid Analysis Instrumentation for Planetary Science

Project Description

This project is focused on developing a microfluidic means of analyzing and detecting organic molecules, using silicon-based materials and microfabrication techniques, for use in future astrobiology missions. Work may include clean room fabrication and optimization of nanoscale and microfluidic components, including the use of electron-beam and photolithography for patterning, modification of silicon-based substrates using reactive ion etching and wet chemistry, vacuum evaporation techniques to deposit metal electrodes for device fabrication, and MEMS bonding methods to integrate microfluidic components. Additional work might include testing and characterization of nanoelectronic devices, scanning electron microscopy for evaluation of microscale and nanoscale components, and atomic force microscopy for imaging and manipulation of nanoscale structures. Opportunities to participate in other project work include growth of single-walled and multiwalled carbon nanotubes for novel coating applications and in vacuo testing of various field emitter materials for use in a miniaturized, low- power electron gun.

Mentor's Expectation of Student

The intern should be an independent and self-motivated worker. Prior laboratory, clean room, and microfabrication experience is critical to the project; this will allow the intern to hit the ground running for a meaningful and rewarding internship experience. The intern should be able to work well in a team environment, communicate his/her ideas and results, bring creativity to the work, and survey and interpret relevant literature. The intern will be expected to attend weekly group meetings to give periodic updates on his/her progress and prepare a power point presentation at the end of the summer for branch members and management.

Discipline of Project and/or Background Needed to successfuly complete the project

Applied Engineering

Skills

Clean Room Experience